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Microstructural stability, microhardness and oxidation behaviour of in situ reinforced Ti-8.5Al-1B-1Si (wt%) (Article)

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Abstract

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Microstructural stability, microhardness and oxidation behaviour of an in situ reinforced Ti 8.5Al 1B 1Si (wt%) alloy was examined in both air and argon environments. When exposed for up to 5760 min at temperatures below the $\alpha/\alpha+\alpha_2$ transius, hardening occurred in both air and argon environments. The increase in hardness in the air heat-treated samples is attributed to a combination of solid-solution strengthening due to the oxygen and the precipitation of the α_2 phase, while the increase in hardness in the argon heat-treated samples is primarily due to the precipitation of the α_2 phase. On the other hand, when heat treated above the $\alpha/\alpha+\alpha_2$ transius, after an initial increase in hardness there is a drop in hardness which is attributed due to elimination of the α_2 phase and a decreased contribution of boron and silicon in the matrix towards the solid-solution strengthening by virtue of coarsening of the $TiSi_2$ and TiB reinforcements. Oxidation of the alloys follows a parabolic oxidation law when oxidized both in an environment of flowing air and static air with the primary oxidation product being TiO_2. The activation energy for oxidation is 200 kJ mol^{-1} in an environment of flowing air and 303 kJ mol^{-1} in static air. The difference in activation energy arises from the difference in the availability of oxygen at the reaction front in the two cases. © 1998 Chapman & Hall.

SciVal Topic Prominence

Topic: Titanium carbide | Spark plasma sintering | Titanium matrix

Prominence percentile: 95.973

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